

PATENT

PORTABLE COOKER

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CROSS REFERENCE TO RELATED APPLICATIONS:

[0001] Not applicable.

STATEMENT REGARDING FEDERALLY SPONSORED

RESEARCH OR DEVELOPMENT

[0002] Not applicable.

REFERENCE TO A SEQUENCE LISTING, A TABLE, OR A COMPUTER PROGRAM

LISTING COMPACT DISK APPENDIX

[0003] Not Applicable.

BACKGROUND OF THE INVENTION

[0004] The present invention relates generally to portable stoves and ovens for cooking using available combustible solid fuels.

[0005] Many people throughout the world use electric or gas ovens, microwave ovens and stovetops for cooking. However, many more do not. Stoves and ovens that use wood, propane, charcoal, peat, dung, or chemical combustibles are often used out of convenience or necessity. For example, those hiking long distances may build campfires for cooking and for

warmth. Campers may include small portable propane stoves specifically for camping among their camping gear.

[0006] Not everyone has a choice in the way to cook. Many people in underdeveloped countries cook in primitive ways, perhaps using campfires or simple structures in which to burn whatever solid fuels are available. Many times these primitive heat sources are inefficient, consuming a lot of fuel for the amount of cooking actually being done.

[0007] However, even when the most modern cooking appliances are available, the results are not always optimal. The taste of food is often better when the right combinations of browning and residual moisture content are obtained. Those combinations do not always result from the use of the most modern cooking appliances.

[0008] Thus there remains a need for a better way to cook, particularly for those who do not have access to conventional stoves, ovens, microwave ovens and the like, whether by choice or not, and preferably a way to cook that is more energy efficient and also, ideally, more easily portable.

## SUMMARY OF THE INVENTION

[0009] According to its major aspects and briefly recited, the present invention is a portable cooker. The present cooker in all embodiments is a small stove for simple outdoor cooking and, in one embodiment, baking.

[0010] An important feature of the present invention is that the cooker disassembles without tools into a series of flat components that can be stored or carried easily with minimal space requirements.

[0011] Another important feature of the present invention is that it is preferably made to have a frusto-conical shape that has two advantages. This shape is very stable and is more energy efficient. The present cooker also has a cooking surface that takes the heat, concentrated by the frusto-conical shape, and delivers it to the food-holding container placed on the surface, thereby avoiding wasted heat thrown to the sides of the container.

[0012] Still another important feature of the present invention is the use of copper to transmit heat in a controlled manner. The heat follows copper readily, more so than many other metals, delivering it to where it is desired and thus wasting less heat.

[0013] Another feature of the present invention is an oven that surrounds a baking chamber with heat from the cooker below it and thus bakes with surprisingly good results.

[0014] Other features and their advantages will be apparent to those skilled in the art of lamp design from a careful reading of a Detailed Description Of The Invention accompanied by the following drawings.

#### BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

[0015] Fig. 1 is a perspective, partially exploded view of a cooker according to a first preferred embodiment of the present invention;

[0016] Fig. 2 is a perspective, partially exploded view of a cooker according to a first preferred embodiment of the present invention

[0017] Fig. 3 is a perspective view of a cooker according to a first preferred embodiment with alternative stands;

[0018] Fig. 4 is a perspective view of the cooker of Fig. 3 shown disassembled, according to the first alternative embodiment of the present invention;

[0019] Fig. 5 is a perspective view of an alternative cooker according to a second preferred embodiment of the present invention;

[0020] Fig. 6 is a cross sectional side view of the alternative cooker shown in Fig. 5.

## DETAILED DESCRIPTION OF THE INVENTION

[0021] The present invention is a device for cooking, that is, for serving as a heat source for food and beverages, which device will be referred to simply as a cooker. The present cooker can heat the bottom of a container of food in the same fashion as a stovetop does or, in an alternative embodiment, it can surround a food item, in a container or otherwise, with heat in order to bake the item, as in an oven. It has a secondary function as serving as a heat source for individuals.

**[0022]** Referring now to Figs. 1-4, the present cooker, generally referred to with reference number 10, includes a body 12 and a grid 14. It may also include a cook surface 16 and stands 18. Stands 18 may have slits 24 formed in them to receive body 12.

**[0023]** Body 12 is generally cylindrical in shape but is preferably slightly frusto-conical in shape so that the diameter of its top 30 is smaller than the diameter of its bottom 32 in order to concentrate heat and be more stable. Body 12 is made of a single piece of sheet metal with folds 34, 36, at opposing ends that can be interlocked for body 12 to hold the cylindrical or frusto-conical shape but to allow it to be unfolded flat when it is to be stored, perhaps slightly curved inside a backpack. The term cylindrical will be used herein to include frusto-conical unless the latter term is specifically used.

**[0024]** It is important to allow air to flow into body 12 and out of body 12. Air flowing in brings oxygen for combustion; air flowing out takes exhaust gases with it. Accordingly, body 12 can have small cutout portions 40 at bottom 32 (Fig. 1) for mating with stands 18 to elevate cooker 10 above a surface on which it is placed. Correspondingly, upstanding tabs 42 at top 30 define openings 44 through which exhaust gases may exit body 12 at top 30.

**[0025]** Grid 14 is a disk with plural holes formed therein, preferably a circular disk of expanded metal. Grid 14 has extensions 50 at several locations around its periphery that extend through holes 52 in body 12, when extensions 50 are brought into registration with holes 52, for supporting grid 14 at a distance above bottom 32 of body 12. Grid 14 is adapted to hold fuel while permitting air to flow up through grid 14 and the fuel and thereby permit the creation of a

draft within body 12 to facilitate combustion. The frusto-conical shape of body 12 also facilitates the establishment of a draft by forcing the acceleration of the heated air upwards from cutout portions 40 or the spaces between stands 18 at bottom 32 upwards within body 12 to exit at openings 44 at top 30. Holes 52 may be round or rectangular and should be sized to make it easy to put extensions 50 through them as body 12 is curled around grid 14 during assembly and squeezed to release interlocking folds 34, 36. Also, extensions 50 and holes 52 are preferably deployed about body 12 to provide stable support for grid 14, most preferably three extensions 50 and three holes 52 at approximately 120 degree intervals are sufficient.

[0026] Cook surface 16 is preferably made of copper or other metal or metal alloy that quickly and readily conducts heat, and has an extended portion 54 along its periphery to facilitate lifting. Preferably extended portion 54 has a hole 56 formed in it that can be used in combination with a tool or stick 60 to lift cook surface 16 when it is hot.

[0027] Note from the illustration in Fig. 4 that the components of the present cooker 10 can be disassembled without tools and laid flat. Grid 14, cook surface 16 and stands 18 are already flat. Body 12, once cooled, and it cools quickly because it is made of metal is squeezed to release interlocking folds 34, 36. Once folds 34, 36, are released, body 12 can be unrolled from its cylindrical or frusto-conical shape and placed flat. Alternatively, body 12 can be inserted in a backpack so that it follows the curve of the backpack's sides. Grid 14, cooking surface 16 and stands 18 can be placed in a plastic bag and carried easily in a backpack or one of its pockets.

**[0028]** Fig. 5 and Fig. 6 illustrate another embodiment of the present invention. In this embodiment, there is a cooker 70 having a body 72 and a grid 74 that function in the same manner as cooker 10 with its body 12 and grid 14. Other than being dimensioned to be somewhat larger, the primary differences are a lower air-controller 80, a fuel hatch 82, an upper air-controller 84, and an optional oven 86.

**[0029]** Lower air-controller 80 is a collar 90 with plural holes 92 formed therein. Plural holes 94 are also formed in body 72. Holes 92 can be brought into and out of registration with holes 94 to increase or decrease the flow of air into the interior of body 72. Collar 90 is made to be easily rotatable coaxially with body 72 but can be secured by tightening a bolt 96 running through flanges 98 at the end of collar 90, thereby pulling flanges 98 together and tightening collar 90 to body 72. Collar 90 is preferably dimensioned to be below grid 74 and near bottom 100 of body 72.

**[0030]** Grid 74 has extensions 104 that extend through holes 106 in body 72 so that body 72 can support grid 74. Preferably three extensions 104 and three holes 106 arranged at 120° intervals is sufficient.

**[0031]** Fuel hatch 82 is intended to allow the user to add fuel after setup. Hatch 82 is preferably hinged to body 72 in such a way that it can be lifted to an open position or lowered to a closed position easily. Most preferably, when lifted, hatch 82 pivots about a ring hinge 110 and will remain in the lifted position with its edges propped against body 72 until lowered. Fuel hatch 82 is of course preferably located above grid 74 in the side of body 72.



[0032] Above fuel hatch 82 is a support surface 116 that is a flat, disk-shaped piece of sheet metal having a holed formed therein large enough so that it slips over a top 118 of body 72 and comes to rest on the exterior of body 72 several inches from top 118. Support surface 116 acts to support oven 86, as will be described below.

[0033] Above the operational position of support surface 116 is upper air controller 84, which, like lower air controller 80, includes a collar 120 having plural holes 124 that can be brought into registration with plural holes 126 in body 72 by rotation of collar 120. Collar 120 is adapted to rotate freely but be securable to body 72 by tightening a bolt 130 to bring the flanged ends 132 of collar 120 together.

[0034] Oven 86 includes a baking chamber 140 and a housing 142. Baking chamber 140 fits within housing 142, which creates a heated environment surrounding baking chamber 140. Baking chamber 140 includes a cylindrical body 144, base 146 and lid 148. Helping to seal base 146 to body 144 and body 144 to lid 148 are gaskets 150 and 152, respectively. These are preferably made of copper channel metal but may be made of any other heat conducting, flexible material. Once body 144 is placed on base 146, base 146 is secured to lid 148 using thin cables 154 and latches 156 that pivot to pull cables 154 tight and hold baking chamber 140 together. Inside baking chamber is a cooking rack 160 held in place preferably by additional cables 162 secured to body 144 using bolts 164. Food items such as breads, pies, cakes, casseroles, chickens and potatoes can be baked on rack 160 within baking chamber 140. The height of rank 160 is preferably set so that the top of the food item is an inch or so below lid 148.

**[0035]** Except for lid 148, baking chamber 140 is preferably made entirely of copper or other metal or metal alloy that conducts heat readily so that heat received from the combustion of fuels on grid 74 is transmitted to base 146 and thence to body 144 and to top 148 quickly so that body 144, base 146 and top 148 radiate heat evenly into the interior of baking chamber 140. Lid 148 has preferably two layers: a copper lower layer 184 and a stainless steel upper layer 186. This combination helps to prevent warping of lid 148 as a result of prolonged exposure to heat.

**[0036]** Housing 142, preferably made of stainless steel or other alloy that conducts heat less readily than copper or other metal baking chamber 140 is made of will tend to hold heat in and surround baking chamber 140 with heat. Housing 142 rests on support surface 116 and includes only a body 166 and a lid 168. Preferably lid 168 has a layer of heat insulation 188 on top of it. Smoke and other exhaust gases can circulate within housing 142 (but not enter baking chamber 140) and exit from a gap 170 between support surface 116 and body 166. Preferably wedges 172 can be used to enlarge gap 170.

**[0037]** A thermometer 174 is important to use, as baking requires a reasonable degree of control over the temperature inside baking chamber 140. Thermometer 174 extends from outside housing 142 through a first hole 176 formed therein into baking chamber 140 through a second hole 180 formed therein.

**[0038]** Without wishing to be bound by theory, it is believed that the present baking chamber 140 promotes browning without excessive moisture loss. Browning, while nominally improving the appearance of food, also contributes to the flavor of food, particularly baked products. The Maillard reaction, in which amino groups of amino acids, peptides and proteins

react with the glycosidic hydroxyl groups of sugars to form brown pigments, is known to enhance flavor and aroma. The present chamber 140 has been observed in testing to produce superior browning of pies, for example, when compared to that achieved using standard ovens. Not only is browning more even, but flavor and aroma is enhanced. It is believed that the smaller confines and relatively sealed conditions of chamber 140 produce this effect. Liquids in the food are not lost or dispersed but are retained to be absorbed by the sugars in the food item and slow the gelatinization process to become lighter and more tender.

[0039] To use cooker 70 for baking, a food item such as a pie 182 is placed on rack 160 and lid 148 placed on body 144. Lid 148 is secured to base 146 using cables 154 and latches 156 are pivoted closed to pull lid 148 on tightly. A fire is started in body 72 using available fuel such as wood or dried dung by inserting the fuel through open fuel hatch 82 and adjusting lower air controller 80 and upper air controller 84. An optional hose 182 that preferably has flexible plastic portion 184 and a metal portion 186 can be used to increase airflow while the fuel is catching fire by blowing in plastic portion 186 while holding metal portion in holes 92, 94. Once the fire is burning evenly, support surface 116 can be put into position and baking chamber placed on top 118. Housing 142 is lowered over baking chamber 140 and first and second holes 176, 180, respectively, are brought into registration by rotating housing 142. Once holes 176 and 180 are aligned, thermometer 174 can be inserted. If the temperature reading on thermometer 174 is too low, fuel can be added and lower air controller 80 adjusted to produce a hotter flame. If the temperature is too high, lid 168 can be lifted for a few moments, water can be squirted on the fuel or lower air controller 80 adjusted to reduce the amount of air flowing into body 72.

Combinations of these can be used to maintain the temperature inside baking chamber within a pre-selected range of temperatures.

**[0040]** Cooker 70 can be disassembled into its components and bodies 72, 144, and 166 flattened in the same manner as body 12. Bodies 72, 144, 166, all have seams 190, 192 and 194 that are formed by interlocking folds formed in their respective edges. By squeezing bodies 72, 144, 166, these interlocking folds can be unlocked and separated. Once unlocked, bodies 72, 144, 166 may be pressed flat. Collars 90 and 120 can be unbolted and opened nearly flat. Thus, cooker 70 can be stored in a relatively compact configuration for later use, easily re-assembled without tools and used again.

**[0041]** It is intended that the scope of the present invention include all modifications that incorporate its principal design features, and that the scope and limitations of the present invention are to be determined by the scope of the appended claims and their equivalents. It also should be understood, therefore, that the inventive concepts herein described are interchangeable and/or they can be used together in still other permutations of the present invention, and that other modifications and substitutions will be apparent to those skilled in the art of lamp manufacture from the foregoing description of the preferred embodiments without departing from the spirit or scope of the present invention.